**Typology construction and use in Africa RISING**

***Making your research outputs relevant for different types of farmers***

Introduction (what **is** a typology)

* Goals for typologies in AR: projects that aim to contribute to sustainable innovation of farming systems have to deal with heterogeneous populations of farmers within rural landscapes. Creating a typology is one of the approaches to deal with this diversity. A typology groups the farms into clusters that are relatively similar. This can help to:
  + Identify suitable farms to target innovations: we assume that not all innovations are appropriate for all farms, and that structuring into groups would support the identification of suitable farming systems.
  + Allow tailoring of technologies to best-fit particular farm types (niches).
  + Scale up effects of innovations: on the basis of characteristics of the clusters in a typology we can ‘populate’ a landscape and interpolate what the impacts are if larger numbers of farmer adopt.
  + Select farms to work with in projects: in co-innovation projects we want to work with farms that represent the diversity of farms in a landscape. For that we can select representative farms from different clusters.
  + Scale out innovations: on the basis of the heterogeneity in a population we can formulate extension messages, policies and other incentive schemes to further spread the use of designed innovations.
  + Explaining trends and farmer ‘behavior’ (functional characteristics, including sustainable intensification indicators) and verification of the impact of interventions for different farm types on their performance afterwards (ex-post).
* Kinds of typologies
  + Statistical, using quantitative data that are often derived from farm or household surveys, employing multivariate statistical methods.
  + Expert-based, grouping informed by the knowledge of expert about the farming community.
  + Participatory, grouping of households on the basis of community perception
  + Ex-ante versus ex-post

Quantitative approaches have the advantage that they are reproducible, while the more qualitative approaches can potentially incorporate less tangible insights such as cultural patterns. The quality of results of both approaches can be compromised, for instance by inaccurate data collection (quantitative) or by power relations or other socio-institutional pressures (qualitative). Both approaches are subject to interpretation, so never completely “objective”.

* Approaches for construction and use: all approaches require a good knowledge of the biophysical conditions and the community and its cultural habits and institutional setting. Based on these insights an initial hypothesis of the diversity of the community can be formulated. This hypothesis is subsequently tested, using one of the available quantitative or qualitative approaches, and either confirmed or rejected and adjusted.

In Africa RISING we acknowledge that for different categories of innovations different typologies can be required. For instance, to target livestock-related interventions could require a different clustering of farms than innovations regarding use of legumes or crop residues.

1. Methodological steps (how to **make** a typology)
   1. General guidelines

A protocol for statistical typology construction is available in the CGIAR repository:

<http://humidtropics.cgiar.org/constructing-typologies-to-capture-farming-systems-diversity/>

This approach has the following steps:

* Formulate objectives and hypotheses
* List relevant variables dependent on the objective
* Design a data collection scheme and collect data
* Select households/farms to survey
* Cluster the households/farms into groups
* Verify the results with the initial hypothesis

For participatory typology: see Kuivanen et al. (submitted).

* 1. Operationalization in Africa RISING: application to Ethiopia

The SLATE (Sustainable Livelihoods AsseT Evaluation) software tool has been developed by ILRI researchers working on the Africa RISING project in Ethiopia to:

* Characterize the diverse, capital assets (financial, human, natural, physical, and social) that affect the livelihoods of households within a target community;
* Identify groups of households with similar patterns of livelihood asset endowment. This will help the project’s on-farm research to target common problems and common solutions within those groups.

A SLATE analysis starts with the identification of a set of community-specific, livelihoods asset indicators by a cohort of key informants. Interviews are then conducted to evaluate these individual indicators across a representative sample of householders in order to generate the SLATE dataset.

Resources to assist with the implementation of a SLATE analysis are available online (<https://africa-rising.wikispaces.com/SLATE_resources>)

* 1. Operationalization in Africa RISING: application to all project countries

IFPRI is adopting a quantitative approach to define typologies across countries, using the detailed data collected through the household and community Africa RISING Baseline Evaluation Surveys (ARBES). This approach has the advantage of being consistent, harmonized, and reproducible in all project countries. Initially, a wide range of variables will be constructed, reflecting household and agricultural characteristics, assets owned, access to markets and biophysical conditions. Subsequently, principal component analysis (PCA) will be applied to cluster the households into different homogeneous groups, or “types”, and a dendogram to visualize the position of each cluster in relation to the other cluster will be produced. This statistical technique allows to consider a wide range of dimensions and systematically select the most relevant in forming and differentiating the groups. Once the typologies are obtained, they will need to be verified with the initial hypotheses, and validated by the research teams on the ground. The plan is to construct typologies by region/agro-ecological zones, depending on the country. It was envisaged to produce four typologies for Ethiopia (one for each region where AR project is operating, Oromia, Amhara, Tigray, SNPP); two for Tanzania (one for Babati district; the second grouping Kongwa and Kiteto districts); three for Ghana (one for each region: Upper West, Upper East, Northern region); two for Mali (based on agroecological zone); and finally two for Malawi (one for each district, Dedza, and Ntcheu). In additional one typology by country will be produced, as will one overall AR typology grouping all countries. An overlap analysis will inform about commonalities and differences among typologies constructed across different scales, to help selection and targeting.

1. Applications (how to **use** a typology)

Researchers that want to use a typology for one of the purposes mentioned in the *Introduction* can either use an existing typology if it is suitable for their needs, or develop a typology specifically for their purpose (if needed with support of IFPRI or WUR researchers). To develop a typology you will need:

* A protocol (see section *Methodological steps*)
* A dataset (see section *Available data sources*)

Practical application of typologies:

1. To design and develop interventions for target types.

This could reverse the targeting approach: instead of first developing a technology and then finding a potential users group, researchers could develop technologies for specific farmer types. It is expected that this would increase the efficiency of innovation process.

1. To select specific types of farmers to work with in participatory development processes or other interactions with communities.
2. To investigate adoption and adaptation behavior by different types as ex-post analysis of effectiveness of interventions; and extrapolation of potentials.

Applications a. and b. require determination of the type to which (new) farmers belong. A tool for assigning newly encountered households/farms to an existing typology in the field can be developed on the basis of Bayesian statistics and a small set of variables. This will yield probabilities of the farms belonging to each of the types. Such a tool could be learning by adding the newly added entries to the database and performing a re-clustering.

**Research questions wherein typologies play a role:**

* **Are there differences in adoption pattern of ‘uniform’ technologies between types, and are there differences in the effectiveness after adoption, i.e. quality of application / implementation?**
* **How (cost-) effective is the targeted technology design per type and is uptake and resulting performance better?**
* **How are the different types of farmers facilitated or pressured by external forces of community influence (either pressure or collaboration for instance in cooperatives), market / buyer demands and other features of the institutional context?**
* **How are the different types impacted by development, innovation and adoption dynamics, are there specific types that are winners or losers? How is this related to levels of farm endowment and biophysical heterogeneity?**
* **How do farmers/individuals belonging to different types develop in time? Are there coherent patterns per type? Do farmers shift between types?**
* **What are the differences in farm performance in terms of SI indicators between the types? How are the SI indicator values changing in time for the different types?**

1. Available data sources

See farm typologies page on the wiki!

Annex

Exercises/training during learning event or science meeting (March 2016)